

THE CABBAGE ROOT APHID

GEORGE P. WENE AND A. N. WHITE

Texas Agricultural Experiment Station and Texas Agricultural Extension Service, Weslaco

The cabbage root aphid, *Pemphigus populitransversus* Riley¹ was found in destructive numbers in practically all cabbage fields in the Lower Rio Grande Valley of Texas during the winter months of 1951-52. The activity of this insect has been observed since 1947 in stunting a few plants, but never causing enough damage to consider it a pest. The 1951-52 cabbage crop was grown under severe drouth conditions, which was accentuated by the lack of irrigation water from the Rio Grande River. The cabbage root aphid was first noticed in fields which were suffering from a lack of irrigation water.

Hull (1929) called this aphid the turnip root louse and stated that this aphid increased or exaggerated the injury caused by the turnip aphid, *Rhopalosiphum pseudobrassicae* (Davis), to turnips. He stated that the cottonwood tree was the summer host of the turnip root louse. Gillette and Bragg (1915) listed *Populus* as the winter host and stated that the alternate host is unknown. It is significant to record that on March 25, 1952, which is usually the end of the cabbage season, a farmer collected a large number of the winged forms of *populitransversus*, from the base of a cottonwood tree at Harlingen, Texas.

Cabbage root aphids were first found in large numbers, 25 or more per square inch of soil surface, when the heads of cabbage were at least 2 inches in diameter. These aphids were found feeding on the secondary and adventitious roots to a depth of 8 inches in rather dry soil. After the adventitious roots and secondary roots had been destroyed, the aphids were found feeding on the tap root. With the destruction of the secondary and adventitious roots, the plants became stunted and yellowish in color. Heavy root aphid infested plants, in a well watered field, could be detected on a hot dry day by the fact that severely infested plants would have a wilted appearance, as if suffering from a lack of water. Such severely infested plants seldom produced a marketable head even when sufficient water was applied during the remainder of the growing season.

In the Lower Rio Grande Valley, cabbage fields are tilled in such a manner as to have raised beds about 36 inches apart. These beds are from 8 to 12 inches high with the cabbage planted on top. In irrigating the fields, the water is diverted in the depression between the beds at such a rate that the water is almost as high as the beds. It was observed that such irrigations washed out a great number of cabbage root aphids. Furthermore, during the irrigation process the cabbage root aphids were seen migrating to the surface of the soil, on top of the plant bed, apparently in order to escape the water. Two or three days after an irrigation and while the soil was still saturated with water, aphids were still found on the surface of soil, usually under dead leaves or other organic matter lying on the soil surface. Numerous digging observations indicated that the aphids migrated to depths of 3 to 5 inches only when the soil had become fairly dry. The few cabbage fields which were irrigated at 7 to 10 day intervals produced good yields of cabbage in spite of root aphid infestations. However, irrigations were of little value in one field when the water applications were started after a severe infestation had already been established. Hawley (1925) stated that the sugar-beet root aphid, *Pemphigus betae* Doane, can be controlled by practicing early and frequent irrigations. He further stated that the sugar-beet root aphid

¹Identified by L. M. Russell, Bureau of Entomology and Plant Quarantine, U. S. D. A.

does not thrive well under moist conditions, and apparently the cabbage root aphid is similar in this respect as shown by the fact that cabbage was produced in well irrigated fields in spite of heavy aphid infestations, and also that the heaviest aphid infestations were found in fields which were suffering from a lack of irrigation water.

In three fields of well irrigated cabbage, numerous Dipterous pupae were found at a depth of approximately one inch from the surface of the soil. Forty pupae were found in a cubic inch of soil. Further examinations showed a number of larvae feeding on the cabbage root aphids. Adults were reared from these larvae and pupae and were identified as *Thaumatomyia apacha* Sabr.² A survey revealed that these predatory insects were abundant only in well irrigated fields. Observations taken on December 15, 1951, showed that the cabbage root aphid was very abundant in a field near Pharr. On January 15, 1952 very few aphids were found on the cabbage roots in spite of the fact that the roots were covered with the white downy-like material which is associated with cabbage root aphids. However, numerous larvae and pupae of the predator were found, which indicated that the predator was a factor in the reduction of the root aphid population. Parker (1918) showed that *Thaumatomyia glabra* Meig., a closely related predator, is an important biological enemy of the sugar-beet root louse (whose life history is similar to that of the cabbage root aphid).

An attempt was made to control the cabbage root aphid by the addition of insecticides to the irrigation water. The field in which the experiment was conducted was of such a length that 10 rows of cabbage were an acre in size. The head of water in the irrigation ditch was of such a size that 10 rows could be irrigated at the same time in a period of one hour. The insecticide, in an emulsion form, was added to a 50 gallon drum of water, and then allowed to drip into the irrigation ditch at such a rate that the drum would be emptied at the same time that the plot had sufficient water. Single plots were treated, at the following acre rate, with: 1-pound of parathion; 1-pound of gamma benzene hexachloride; 1-quart of 40 percent TEPP; and water alone. A week after the treatment applications, soil samples were taken near 12 plants in each plot. A hand trowel was used in digging out a large lump of soil adjacent to the tap root of the cabbage plant. This lump of soil was then broken in 4 or 5 pieces, and the aphids counted on a square inch of surface from one of the pieces having the largest population. The treatments showed the following average number of aphids per square inch of surface: 1-pound of parathion, 5.2; 1-pound gamma benzene hexachloride, 6.2; 1-quart 40 percent TEPP, 7; and 10.7 for plot which was treated with water. The data indicate that the control obtained was not sufficient to be of any practical value.

In the second experiment, 4 plots each 10 feet long and 6 feet wide were laid out in a field of cabbage. Fifty gallons of water were added to the first plot. The remaining plots received the same amount of water but emulsifiable Metacide was added at the rate of 1, 2, and 4 pounds per acre. Three days after the treatment applications, 20 soil samples were taken from each plot and the number of surviving aphids determined. The treatments showed the following number of aphids per square inch of soil surface; 1-pound Metacide, 5.1; 2-pounds Metacide, 5.2; 4-pounds Metacide, 4.3; and in the plot which only received water, 8.9. The control obtained was not sufficient to be considered economically practical.

SUMMARY

The cabbage root aphid, *Pemphigus populitransversus* Riley, was found in destructive numbers on the roots of cabbage during the extremely dry growing season of 1951-52. The injury was most severe in those fields suffering from

²Identified by C. W. Sabrosky, Bureau of Entomology & Plant Quarantine, U. S. D. A.

lack of water. Cabbage which was irrigated at regular intervals did not show much injury from the cabbage root aphid.

A predator, *Thaumatomyia apache* Sabr., was found feeding on the cabbage root aphid. This predator was more abundant in well irrigated fields than in those suffering from a lack of water.

Insecticides such as parathion, metacide, gamma benzene hexachloride, and TEPP failed to control the cabbage root aphid when applied in the irrigation water.

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